

Operation Manual

TIME SIGNAL REPEATER

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Time Signal Repeater
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Note: Information in this manual is subject to change without prior notice or permission.

Warning Symbol 

The symbol calls attention to the operating procedure, practice or the like which if not correctly performed or adhered to , could result in personal injury or damage to or destruction of part or all of the product and system. Do not proceed beyond a warning symbol until the indicated condition are fully understood and met.

1. INTRODUCTION

1.1 Purpose of the Manual

How to read this manual???

Installer: Read Chapters 1, 3.

System Designer and New User: Read All Chapters

Expert User: Read Chapters 3, 4, 5.

Regarding This User's Manual

- A) This manual should be provided to the end user. Keep an extra copy or copies of the manual in a safe place.
- B) Read this manual carefully to gain a thorough understanding of operating this product before starting operation.
- C) This manual describes the functions of this product. Masibus does not guarantee the application of these functions for any particular purpose.
- D) Under absolutely no circumstances may the contents of this manual, in part or in whole, be transcribed or copied without permission.

1.2 Product over View / Description:

- A) Time Signal Repeater is housed in 1U/21T wall mounted (Optional-Din Rail mount) package
- B) Time Signal Repeater (TSR) is an analog system that accepts signals like 1PPS, IRIGB TTL, IRIGB Modulated and RS-232 from GPS Clock Product and gives four number of isolated outputs of each signal same as input.
- C) There are five different types of modules available such as 1PPS, IRIG-B TTL, RS- 232, EVENT and IRIG-B MODULATION.

2. SAFETY / WARNING PRECAUTIONS

2.1 Safety Precautions

Dangerous voltages capable of causing death are sometimes present in this instrument. Before installation or beginning of any troubleshooting procedures the power to all equipment must be switched off and isolated. Units suspected of being faulty must be disconnected and removed first and brought to a properly equipped workshop for testing and repair. Component replacement and interval adjustments must be made by a company person only.

2.2 Warning Precautions

- A) Before wiring, verify the label for correct model number and options.
- B) Wiring must be carried out by personnel, who have basic electrical knowledge and practical experience.
- C) All wiring must be confirmed to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for voltage, current, and temperature rating of the system.
- D) Beware not to over-tighten the terminal screws.
- E) Verify that the ratings of the output devices and the inputs as specified in Chapter 5 are not exceeded.
- F) Upon receipt of the shipment remove the unit from the carton and inspect the unit for shipping damage. If any damage due to transit, report and claim with the carrier. Write down the model number and serial number for future reference when corresponding with our *Customer Support Division*.
- G) Do not use this instrument in areas such as excessive shock, vibration, dirt, moisture, corrosive gases or rain. The ambient temperature of the areas should not exceed the maximum rating specified.
- H) Provide power from a DC power supply.

3.0 Time Signal Repeater

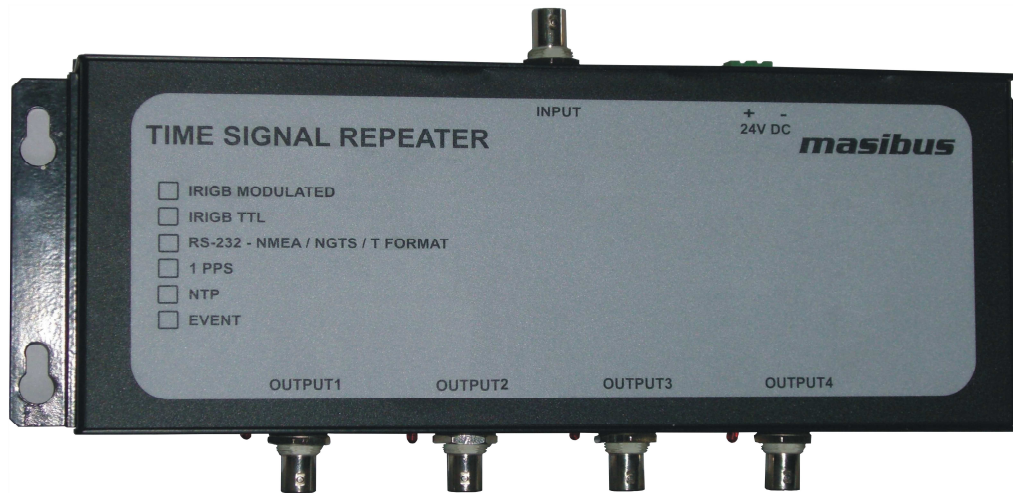


Figure 1: Time Signal Repeater-TSR

3.1 Features

The masibus make Time Signal Repeater (TSR) generates multiple output from given input. TSR also amplifies & isolate outputs.

- Reliable and cost effective
- Slim wall mount enclosure
- Different models are available for
 - IRIG-B modulated
 - IRIG-B TTL
 - RS-232
 - 1PPS
 - EVENT
 - NTP
- High intensity LEDs for input, output & power indication
- Reverse Polarity Protection for Power Supply
- Isolation between input & output
- Isolation between Each outputs

3.2 Time and Event Signals (Input / Output):

Output Signal	Description(GPS clock O/P)	Isolation	Max Distance*	Connector	Maximum Output
1PPS	<ul style="list-style-type: none"> • 1 Pulse per second • TTL into 250Ω 	1500 VAC Isolation from all other ports, input and output and power supply	50m	Input & Output: BNC Female	4
IRIG B TTL (5V)	<ul style="list-style-type: none"> • TTL into 50Ω 		50m	Input & Output: BNC Female	4
IRIG-B Modulated	<ul style="list-style-type: none"> • Format: IRIG-B12X. • Carrier Freq: 1KHz Sine • Modulation Ratio: 3:1 • 3Vp-p into 100Ω ±10% 		1000 m	Input & Output: BNC Female	4
RS232/RS485	<ul style="list-style-type: none"> • Isolated Serial RS232/RS485 • DB-9 Female connector 		15m	Input & Output: DB9 Female	4
EVENT	<ul style="list-style-type: none"> • Selectable between 1PPS/1PPM/1PPH • Voltage rating: 350 VDC level, 120mA 		50m	Input & Output: Plug in connector	4
NTP (LAN Interface)	<ul style="list-style-type: none"> • Time synchronization protocol: NTP V3, SNTP • Network Protocol: TCP, Telnet, UDP, IPV4 • RJ 45, 10Mbps 		NA	Input: DB9 Female Output: RJ-45	4

*The maximum distance to which an IRIG-B TTL/PPS signal can be transmitted depend on number of factors like Type of cable, Environmental noise, receiver loads, etc

3.3 Individual Specification

3.3.1 1PPS / IRIG B TTL Module

The input pulse is distributed without any change in polarity or duration.

3.3.2 IRIG B Modulation Module

- In input the equipment receives fixed amplitude analog signal from an external IRIG-B source.
- When detecting an input signal, the LED SIGNAL turns ON. The amplified signal is distributed over the 4 isolated outputs of the equipment.
- Each of the four outputs could be adjusted. These settings are the gain of each output amplifier.
- The gain of each amplifier is adjusted by a dedicated potentiometer accessible from bottom.
- The output level is independently settled for each type of output.
- Output Impedance: 100Ω

3.3.3 RS232/RS485 Module

- a) The Time Signal Repeater allows ASCII frame distribution on 4 serial tracks in compliance with RS232 standard.
- b) The output data are diffused with the same characteristics of the available input data.
- c) Transfer speed, parity or number of data bits, couldn't be changed.

3.3.4 EVENT module

- a) Four potential free relay outputs are available on the front facia of the card.
- b) Inverted event logic output. (refer jumper setting in Product manual)

3.3.5 Physical

Mounting	Wall / Din-Rail Mounting
Dimensions (W x H x D)	302 x 106 x 44 mm, For detail refer Mechanical Drawing for Enclosure
Ingress protection	IP20
Weight	1 Kg.

3.3.6 Environmental

Operating temperature	0 to +55 °C
Storage temperature	-20 to +80 °C
Humidity	20-90% Non Condensing

3.3.7 Interface

Display LED	<ul style="list-style-type: none">• Power LED• Individual Status LED per Output
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3.3.8 Power Supply

Power supply	24V DC
Power consumption	< 10 W with standard input option

4.0 COMMUNICATION DETAIL

4.1 The 1PPS Signal

This is a very important timing signal. It is the TTL level pulse with a width of 200ms isolated output coming from the GPS receiver. This 1PPS is connected to the BNC connector on the top panel.

4.2 The Event Signal

The signal is an isolated event output through a static relay contact. This signal is connected to two of the terminal of the MSTB connector on the top side of the Instrument. The event is assigned as isolated event; the frequency for this event can be configured from GPS receiver as 1 minute or 1 hour. The pulse width of the event is 2 second.

4.3 The IRIG-B Signal

The IRIG-B format is a serial format based on a message frame per second which is Co-ordinate with the synchronized 1PPS time output pulse. There are two alternative forms of output, a dc level shift output, and a modulated output. The modulation frequency is 1 KHz.

For each form of output there are three output codes:-

- a. A Reference Mark
- b. A logical 1
- c. A logical 0

For IRIG-B, each one of these codes is 10 ms long, which is 10 cycles for the modulated format. There are 100 possible codes per time frame, although not all of them are used. The code sequence is shown in Table 1, and the waveforms shown in Figure 2. The day number starts at 1 on the first of January.

The output voltage of the modulated waveform is 3 V peak to peak into a 100 ohms load. The dc level output is TTL standard and the rising edge of the pulse is "On Time". 1 kHz modulated IRIG-B signal is connected to BNC on the top of the device. IRIG-B TTL level signal is connected to a BNC connector on the top of the device.

Position	Type	Item	Digit	Position	Type	Item	Digit
0	Reference Mark			27 to 28	Logical 0		
1	Signal	Seconds	1	29	Reference Mark		
2	Signal	Seconds	2	30	Signal	Day	1
3	Signal	Seconds	4	31	Signal	Day	2
4	Signal	Seconds	8	32	Signal	Day	4
5	Logical 0			33	Signal	Day	8
6	Signal	Seconds	10	34	Logical 0		
7	Signal	Seconds	20	35	Signal	Day	10
8	Signal	Seconds	40	36	Signal	Day	20
9	Reference Mark			37	Signal	Day	40
10	Signal	Minutes	1	38	Signal	Day	80
11	Signal	Minutes	2	39	Reference Mark		
12	Signal	Minutes	4	40	Signal	Day	100
13	Signal	Minutes	8	41	Signal	Day	200
14	Logical 0			42 to 48	Logical 0		
15	Signal	Minutes	10	49	Reference Mark		
16	Signal	Minutes	20	50 to 58	Logical 0		
17	Signal	Minutes	40	59	Reference Mark		
18	Logical 0			60 to 68	Logical 0		
19	Reference Mark			69	Reference Mark		
20	Signal	Hours	1	70 to 78	Logical 0		
21	Signal	Hours	2	79	Reference Mark		
22	Signal	Hours	4	80 to 88	Logical 0		
23	Signal	Hours	8	89	Reference Mark		
24	Logical 0			90 to 98	Logical 0		
25	Signal	Hours	10	99	Reference Mark		
26	Signal	Hours	20				

Table 1 – IRIG B Code Sequence

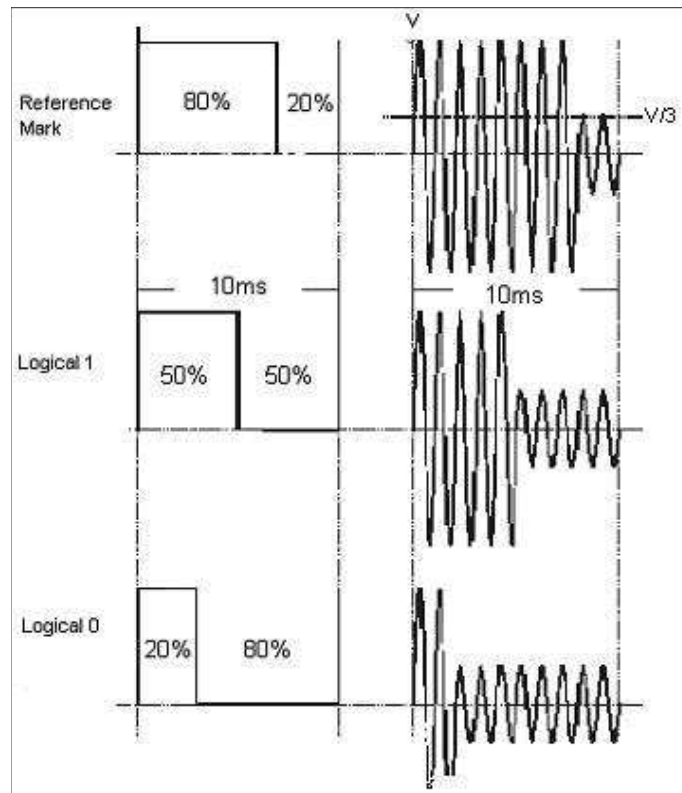


Figure 2: IRIG B Modulated Signal

4.4 RS-232 Outputs

On serial port 9 ways D-type socket, the message is NMEA (\$GPRMC) format, NGTS or T-FORMAT.

4.4.1 NMEA Format RMC RECORD FORMAT

The \$GPRMC sentence contains time and date of position fix, speed and course information. The following examples show the contents of a typical RMC sentence:

The settings for this serial format is 4800, 8, N, 1.

The full data message of this format shall consist of data fields as follows:

Field	Example	Comments
Sentence ID	\$GPRMC,	
UTC Time	130525.00,	hhmmss.ss,
Status	A,	A = Valid/V = Invalid,
Latitude	4250.5589,	ddmm.mmmm,
N/S Indicator	S,	N = North/S = South,
Longitude	14518.5084,	dddmm.mmmm,
E/W Indicator	E,	E = East/W = West,
Speed over ground	000.1,	Knots,
Course over ground	245.0,	Degrees,
UTC Date	291206,	DDMMYY,
Magnetic variation	,	Degrees,
Magnetic variation	,	E = East/W = West,
Checksum	*25	*CC
Terminator	<CR><LF>	Non-printing characters

Table 2: RMC Record Selection

4.4.2 NGTS Format

The settings for this format are programmable. The full data message of NGTS format shall consist of 14 printable characters and a concluding CRLF as follows:

Description	Number of Characters	Character Position	Range of Value/Information
Code Identification	1	1	Capital T
Year in Century	2	2,3	0 to 99
Month	2	4,5	1 to 12
Day of Month	2	6,7	1 to 31
Day of Week	1	8	1 to 7
Hours	2	9,10	0 to 23
Minutes	2	11,12	0 to 59
GMT Marker	1	13	0 or 1
Validity Marker	1	14	0 or 1
CRLF	2	15,16	Non-printing character

Table 3: NGTS Format

The transmission sequence shall be from the Code Identification character through to the CRLF with the most significant digits being transmitted first.

The message shall become automatically available at one second prior to the clock minute epoch.

4.4.3 T-Format

The settings for this format are programmable. The full data message of T-format shall consist of 21 printable characters with a concluding CRLF as follows:

Description	Number of Characters	Character Position	Range of Value/Information
Code Identification	1	1	Capital T
Divider	1	2	:
Year in Century	2	3,4	0 to 99
Divider	1	5	:
Month	2	6,7	1 to 12
Divider	1	8	:
Day of Month	2	9,10	1 to 31
Divider	1	11	:
Day of Week	1	12	1 to 7
Divider	1	13	:
Hours	2	14,15	0 to 23
Divider	1	16	:
Minutes	2	17,18	0 to 59
Divider	1	19	:
GMT Marker	1	20	0 or 1
Validity Marker	1	21	0 or 1
CRLF	2	22,23	Non printing character

Table 4: T- Format

5.0 SPECIFICATION

5.1 COMMON FEATURES

The Masibus GPS signal Repeater amplifies & repeat different outputs as connected to it rear side.

- A) The equipment is housed in a compact 1U/21T rack mounted (Optional: Din Rail Mounted) package.
- B) LED's are located to show the equipment status.
- C) A LED for power supply ON indication
- D) Input signal is on the top side and all the output signals are located on the bottom side of the equipment.
- E) The equipment take power 24V DC by Allied MSTB 5.08 connector.

5.2 INDIVIDUAL MODULE SPECIFICATION

5.2.1 1PPS / IRIG B TTL Module

- A) 5V TTL input level on BNC connector.
- B) 4 numbers of 5V TTL isolated outputs level on BNC connector.
- C) 4 common LEDs to show the status of each output.
- D) The input pulse is distributed without any change in polarity or duration.
- E) Maximum Distance: 50 meters*
- F) Isolation of 1.5KV AC between Power to Output, Input to Output and Output to Output.

*The maximum distance to which an IRIG-B TTL/PPS signal can be transmitted depend on number of factors like Type of cable, Environmental noise, receiver loads, etc

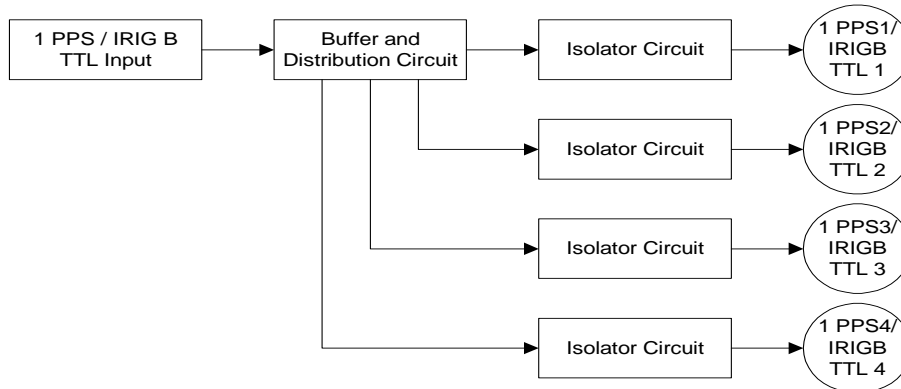


Figure 3: Block Diagram of 1PPS / IRIG B TTL Module

Fig.3 shows the block diagram of the 1PPS/IRIG-B TTL module. The input of the module is buffered by the buffer and then four isolated outputs are provided.

5.2.2 IRIG B MODULATION MODULE

- A) Time Code Amplifier and distributor provide analog IRIG B or any other format, Time code amplification and distribution. The time codes are based on a 1 kHz amplitude modulated (1/3) sine wave carrier.
- B) In input the equipment receives an analog signal from an external IRIG B source.
- C) When detecting an input signal, the LED SIGNAL turns ON. The amplified signal is isolated and distributed over the 4 outputs of the equipment.
- D) Each of the four isolated outputs could be adjusted. These settings are the gain of each output amplifier.
- E) The gain of each amplifier is adjusted by a dedicated potentiometer.
- F) The output level is independently settled for each type of output.
- G) The analog time code signal connector is a base female BNC. The input circuit impedance is more than 600 Ω .
- H) 1 KHz AM Signal
- I) 3:1 Modulation Ratio
- J) Output Impedance is more than 100 Ω .
- K) Isolation of 1.5KV AC between Power to Output, Input to Output and Output to Output.

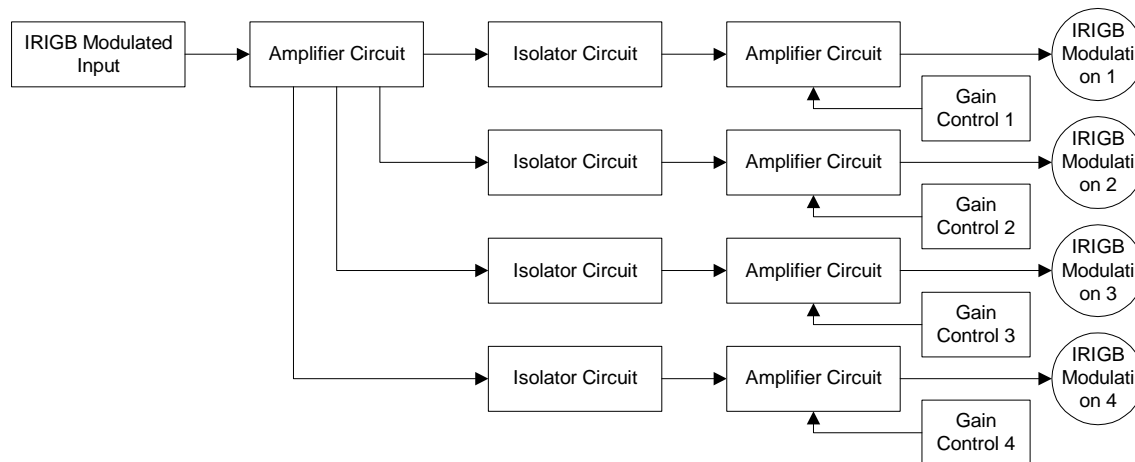


Figure 4: Block Diagram of IRIG B Modulation Module

Fig.4 shows the block diagram of the IRIG-B Modulation Module. Input of the module is first amplified by the amplified circuit then it is divided in to four isolated output with gain control circuit.

5.2.3 RS-232/RS-485 Module

- a) The Time frame distributor allows ASCII frame distribution on
- b) 4 serial tracks in compliance with RS-232 standard.
- c) A One LED shows that power supply is ON.
- d) The output data are diffused with the same characteristics of the available input data.
- e) Transfer speed, parity or number of data bits, couldn't be changed.
- f) 1 input to 4 isolated outputs mode.
- g) The input connectors are SUB'D 9 pins female and outputs are female type.
- h) Isolation of 1.5KV AC between Power to Output, Input to Output and Output to Output.
- i) DB9 Female Connectors
- j) Maximum Distance of 50', maximum distance depends on signal baud rate & quality of cable.

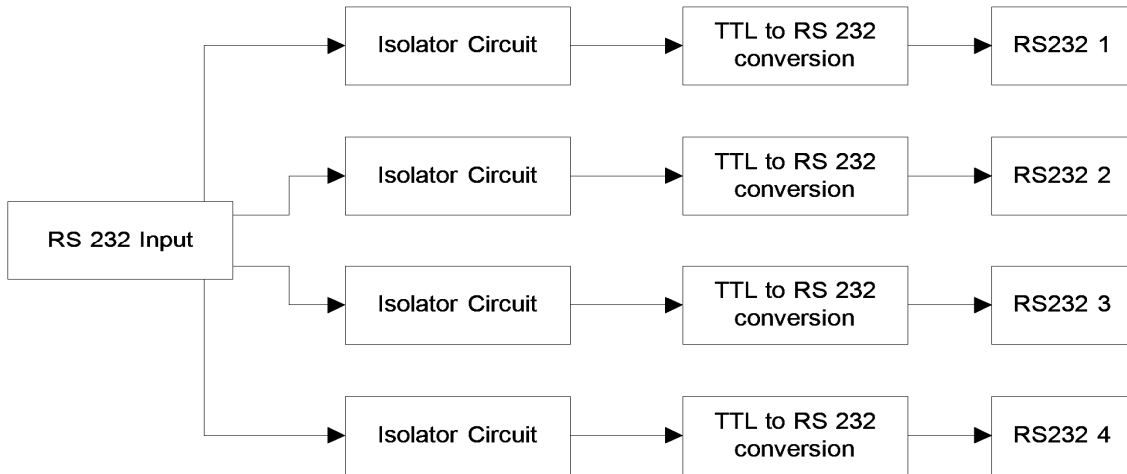


Figure 5: Block Diagram of RS 232 Module

Fig.5 shows the block diagram of the RS-232 Module. Input of the module is first converted in TTL level then it is divided in to four isolated output and then it is converted in to RS-232 format output.

5.2.4 EVENT MODULE

- A) 1 input 4 outputs.
- B) Four potential free relay outputs are available on the bottom of the module.
- C) 4 LED's are available which shows the status of each event.
- D) One power LED shows status of the power of the module.
- E) Inverted event logic output. (refer jumper setting)
- F) 350 V, 120mA maximum
- G) Isolation of 2000 MΩ at 500 VDC between Power to Output, Input to Output and Output to Output

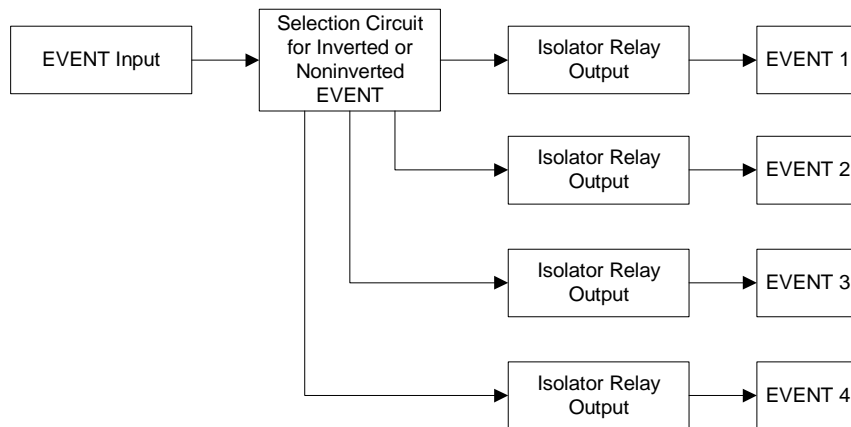


Figure 6: Block Diagram of EVENT Module

Fig.6 shows the block diagram of the EVENT Module. Input of the module is first given to selection and inverter circuit then output of this block is divided in to four isolated output.

6.0 Installation Guide

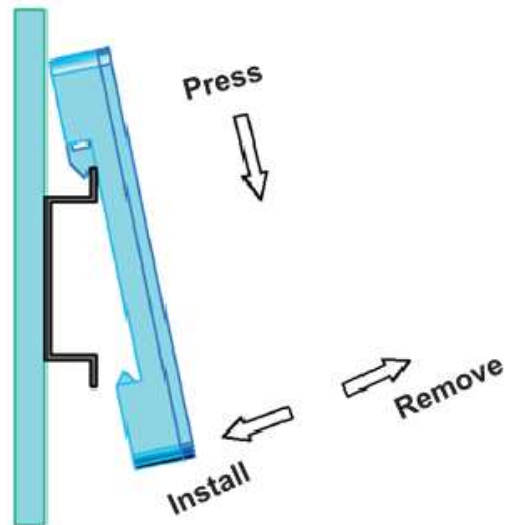


Figure 7: Din Rail Mounting

Installation Steps

- Complete the following steps to install the DIN rail mount device:
 1. Clip the top side of the mounting device on the DIN rail first.
 2. First Push the top side of the device and then push from front side towards the DIN rail.
- The mounting devices can be removed from the rail by two steps:
 1. First Push the top side of the device and then pull from front side towards outside the DIN rail.
 2. Take the top side of the mounting device from the DIN rail.